

## A NEW FOUR-TOED MONGOOSE FROM KENYA, *BDEOGALE CRASSICAUDA NIGRESCENS* ssp. nov.

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### INTRODUCTION

The four-toed mongooses belong to the African genus *Bdeogale* Peters. The genotype, *Bdeogale crassicauda*, was described by Peters in 1852 and currently contains four sub-species. They are distributed through central Mozambique, Malawi and Zambia (*B.c. crassicauda* Peters 1852); northern Mozambique and southern Tanzania (*B.c. puisa* Peters 1852); Zanzibar Island (*B.c. tenuis* Thomas & Wroughton 1908); and northern coastal Tanzania and Kenya (*B.c. omnivora* Heller 1913), according to Coetzee (1967). In addition, most recent authorities (Walker, 1964; Coetzee, 1967) regard *Galeriscus* Thomas as a sub-genus of *Bdeogale*, containing the species *B. nigripes* Pucheran (1855) and *B. jacksoni* Thomas (1894). A new sub-species of *B. crassicauda* is described in this paper and the sub-specific name *nigrescens* proposed.

During a period of mammal trapping by the senior author in February, 1965, a number of specimens of an unfamiliar type of *B. crassicauda* were live-trapped at Lukenya, Kenya. Two of these animals were kept under observation in captivity in Nairobi for several months. Investigations showed that this form of *Bdeogale* did not correspond to existing descriptions of sub-species of the genus but further comparison and description were precluded when the animals escaped from captivity. A further seven specimens were trapped in the same locality during November/December 1967. One animal was kept alive in captivity until April 1968 and three, which were prepared as museum specimens (skull and skin), form the basis of the present description of a new sub-species.

Unfortunately the type specimens of *B.c. crassicauda* and *B.c. puisa* were destroyed by bombs in 1945 while in the Berlin Museum, therefore impossible to compare the new material with these. The holotype of the new sub-species was, however, compared with British Museum examples of *Bdeogale*, viz three specimens of *B.c. crassicauda*, four of *B.c. tenuis* and one of *B.c. puisa*. It was also compared with the type specimen of *B.c. omnivora* (a female) in the United States National Museum. In addition, comparison was made with three specimens of *B.c. omnivora* in the National (formerly Coryndon) Museum (C.M.M.), Nairobi and a further three specimens collected by the junior author from the Sokoke Forest, near Gedi on the Kenya coast.

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## TYPE LOCALITY

The holotype and both paratypes used in the present description were trapped around the base of Lukenya Hill 37 km south-east of Nairobi, immediately to the north of the Nairobi-Mombasa road. Lukenya is a 3 km long ridge of metamorphic Basement System rock running north-east to south-west and rising 60 m. above the surrounding dry savanna (altitude 1840 m.). The vegetation around the base of the hill is grassland with scattered shrubs and trees, especially *Acacia* spp. and *Commiphora africana* (A. Rich.) Engl. There are also grasses on the hill itself, many rambling herbs such as *Cissus quadrangularis* L. and *Sarcostemma viminale* R. Br. and a variety of shrubs but only an occasional tree. In particular *Ficus* spp. are found growing among the rocks. Lukenya is a typical Klipspringer (*Oreotragus oreotragus* Neumann) habitat and a number of pairs of this koppie-dwelling antelope are found there.

Numerous bare outcrops protrude from the sides of the hill and around the bases of these and the many boulders which are strewn around, holes and crevices of a variety of sizes provide excellent shelter for a host of small mammals. Of particular note is the fact that the new sub-species of *B. crassicauda* is found sharing a habitat with four other similar sized carnivores (one mustelid and three viverrids), viz Zorilla (*Ictonyx striatus* Perry); Genet (*Genetta tigrina* Matschie, see Taylor, 1969); Black-tipped Mongoose (*Herpestes sanguineus* Rüppell) and White-tailed Mongoose (*Ichneumia albicauda* G. Cuvier). During a study of viverrids, the junior author has found this type of situation to be quite common.

Attempts to find specimens of *B.c. nigrescens* in other localities up to 80 km from Lukenya have so far been unsuccessful. One report exists of a similar mongoose being seen at Athi River about 8 km from Lukenya. The type locality of *B.c. omnivora* is Mazeras, approximately 450 km south-east of Lukenya near the Kenya coast. There appear to be no records of either *B.c. omnivora* or *B.c. nigrescens* between the two type localities but extensive trapping of this large area has yet to be carried out.

The new sub-species appears to be geographically isolated from other known localities of the species. This marked isolation provides good additional evidence for designating the Lukenya form as a distinct sub-species.

## DESCRIPTION OF THE NEW SUB-SPECIES

The holotype is an adult male, number BM 68.1103, in the British Museum (Natural History). It was collected by the authors on 24 November 1967.

Two paratypes are being designated as follows:

Paratype 1: an adult male, number C.M.M. 7512, in the National Museum, Nairobi, collected by the authors on 6 December 1967.

Paratype 2: an adult male, number C.M.M. 7513, in the National Museum, Nairobi, collected by the authors on 7 December 1967.

The name proposed for the new sub-species is *Bdeogale crassicauda nigrescens*, on account of the very dark, almost black, coat that distinguishes it from other members of the species.

## General features

The new sub-species is a medium-sized, four-toed mongoose with a very dark, almost black, glossy coat and a short bushy tail. The head is rather rounded for a viverrid, giving the appearance of a relatively short muzzle (Fig. 1). Like other members of the species this animal is markedly docile and lacks the aggressive nature of the majority of viverrids when first caught.

### Weight and external measurements (see Table 1)

Unfortunately the weights of the older museum specimens of the genus were not taken. The weight of the new form is much greater than that of recently collected *B.c. omnivora* from the Kenya coast (average 907 g.) although the difference between the body lengths of these two genera is not very great (see below).

The head and body length of *B.c. nigrescens* is intermediate between *B.c. puisa*, which is longer, and *B.c. crassicauda*, *B.c. tenuis*, and *B.c. omnivora* which are shorter. Of the four existing sub-species, the new form is nearest to *B.c. omnivora*. The tail length of *nigrescens* is shorter than all the others except *tenuis* but it is not clear how the tail lengths of the earlier type specimens were obtained. Our own tail measurements for the new sub-species were measured dorsally between the last sacral vertebra and the tip of the last caudal vertebra. The ratio of tail length to head and body length is less in the new form than that of the types of *crassicauda* and *omnivora* and similar to those of *puisa* and *tenuis*.

### Skull measurements (see Table 1)

The skull of *B.c. nigrescens* is greater than that of *B.c. tenuis* in all measurements recorded in Table 1. Conversely, it is less than *B.c. puisa* in all dimensions except the distance between the orbit and the ant-orbital foramen, in which respect the new form is greater. In some dimensions, especially the condylo-basal length, the new form is similar to *B.c. omnivora*. However, greatest similarity is shown with *B.c. crassicauda*, where the only significant difference is in the greater condylo-basal length of the latter.

### Coat characteristics (see Table 2)

As seen from the summary in Table 2, *B.c. nigrescens* is distinguished by having a generally darker coat than the other sub-species. In particular, the back and tail (which is completely black dorsally) are very dark due to a preponderance of long guard hairs, of which at least the distal portion is a shiny black. The coat of the living animal presents a much blacker appearance than the museum skin, due to the fact that in the former the

TABLE I  
Measurements (in g. and mm) of the five ssp. of *Bdeogale crassicauda*

|  | <i>puisa</i> | <i>crassicauda</i> | <i>tenuis</i> | <i>omnivora</i> | Holotype<br>1580 | <i>nigrescens</i><br>Paratype 1<br>1575 | Paratype 2<br>1500 |
|--|--------------|--------------------|---------------|-----------------|------------------|---|--------------------|
| Weight                                       | —            | —                  | —             | —               |                  |   |                    |
| Head and body length                         | 500          | 400                | 410           | 420             | 432              | 443                                     | 473                |
| Tail length                                  | 250          | 300                | 180           | 245             | 232              | 200                                     | 210                |
| Hind foot                                    | 75           | 84                 | 70            | 81              | 74               | 82                                      | 75                 |
| Ear  | —            | —                  | 20            | 34              | 32               | 30                                      | 32                 |
| Condylobasal length                          | 87.5         | 87.9               | 80.8          | 85              | 85.4             | 82.2                                    | 83.4               |
| Zygomatic width                              | 48.5         | 47.4               | 44.1          | 46              | 46.4             | 44.6                                    | 48.3               |
| Interorbital width                           | 20.6         | 18.4               | 16.4          | 18              | 19.4             | 18.2                                    | 19.2               |
| Post-orbital constriction                    | 16.6         | 16.5               | 14.5          | 14              | 16.3             | 15.7                                    | 15.6               |
| Palate length                                | 48.9         | 49.2               | 45.0          | 50              | 49.5             | 47.8                                    | 47.8               |
| Palate width at M <sub>1</sub>               | 27.8         | 26.9               | 25.2          | —               | 27.6             | 26.5                                    | 28.0               |
| Upper tooth row length                       | 38.2         | 38.5               | 35.2          | 40              | 37.9             | 36.6                                    | 38.2               |
| M <sub>1</sub> width                         | 7.0          | 7.0                | 5.9           | 7               | 6.8              | 6.4                                     | 6.9                |
| Distance between orbit & ant-orbital foramen | 3.6          | 4.5                | 2.3           | —               | 3.9              | 4.3                                     | 4.0                |

TABLE 2

Coat characters of the five sub-species of *Bdeogale crassicauda*.  
Numbers in brackets indicate hair length in mm.

| Body Region      | <i>B.c.puise</i>   | <i>B.c.crassicauda</i>  | <i>B.c.temuis</i>  |
|------------------|--|---|--|
| Throat           | 1. Curly hairs, silvery brown.<br>2. Guard hairs light brown banded with white.  | 1. Curly hairs light brown.<br>2. Guard hairs dk. chocolate brown, whitish brown nr. base.  | 1. Curly hairs as long as guard hairs rich orange brown; no distinct banding.<br>2. Rich orange brown, (6).  |
| Ventral Thorax   | 1. Silvery to buff.<br>2. Mid brown, with or without white bands, tip always mid brown   | 1. Silvery hairs, not banded.<br>2. Darker than <i>puise</i> , majority not banded.   | 1. Long, straw coloured tinged with orange.<br>2. Dark brown tips for 2/3 to 1/2 length, base light yellow-brown as in curly hairs, (7).   |
| Ventral Abdomen  | 1. Silvery light brown and not banded.<br>2. Cinnamon to mid brown, banded all similar colour.   | 1. Uniformly matt brown with silvery tinge.<br>2. Shiny black to very dark brown, may be banded white in the mid third.   | 1. Uniform light yellow to light brown.<br>2. Few guard hairs, mid brown with lighter base and roots, (19).  |
| Dorsal Head      | 1. Not present in any numbers.<br>2. Short, mid brown, with two white bands, always brown at tip.  | 1. Uniformly light brown.<br>2. Slightly longer than <i>puise</i> , black tipped then white band, dk. brown band, white band & darker root.   | 1. Light yellow to orange, almost as long as guard hairs.<br>2. Tip dk. brown with reddish tinge for 1/2 length, then light straw band to roots, (9).  |
| Back             | 1. Longer than on head, and light brown.<br>2. Dark tip, light brown band, dk. brown band, white band, mid brown root, (29)  | 1. Uniformly light brown.<br>2. Dark black tip for 1/2 length then white band for 1/6 and then darker region to root, though may be white cont. to root. (46).  | 1. Very thick underfur, chocolate brown, long.<br>2. Rich brown for most of length, lighter brown at base, (30).   |
| Flank            | 1. Curly hairs dense, uniform light cinnamon.<br>2. Lighter than back due to shorter dark bands. May be three straw coloured or white bands between the dk. brown zones.   | 1. Uniformly light brown.<br>2. Long dark tip, virtually black, may only have one light band. (40).   | 1. Very thick underfur, predominately brown-orange.<br>2. Rich brown. Basal 1/2 is an orange to light yellow, (30).  |
| Feet             | 1. Uniformly light brown.<br>2. Short guard hairs, chocolate brown except for white base.  | 1. Few curly hairs, light brown.<br>2. Slightly longer than curly ones, and dk. brown.  | 1. Uniformly light yellow, thinly distributed.<br>2. Chocolate brown with orange brown base, (3).  |
| Tail: Basal 1/3  | DORSAL<br>1. Light with dk. brown tips, one or two mid brown bands, on the whole light coloured.<br>2. Tip 2/3 dk. brown to black, basal 1/3 white, brown and a white or brown base. (44).<br>VENTRAL<br>1. White to straw colour, slightly darker tip.<br>2. Black tip 1/2 to 1/3 the length then white, brown, white, brown bands, (45). | DORSAL<br>1. Whitish yellow to light brown, no distinct banding.<br>2. Tip 2/3 black, then white band and black to root, (50).<br>VENTRAL<br>1. Uniformly straw coloured.<br>2. Black tip for 2/3, then white band, or the white may be continuous to base. (43). | DORSAL<br>1. Definite orange curly hairs in quite large numbers.<br>2. Tip 2/3 reddish dk. brown to black, (24)<br>VENTRAL<br>1. Light orange yellow, sometimes with a black tip.<br>2. Tip 1/2 to 2/3 shiny black to dk. brown; basal region orange (27). |
| Tail: Middle 1/3 | DORSAL<br>1. Very fine, straw coloured.<br>2. Tip 2/3 black brown with reddish tinge, then straw coloured band, dk. brown, white roots, (45).<br>VENTRAL<br>1. Fine straw coloured.<br>2. Tip 2/3 brown black with reddish tinge, (51).  | DORSAL<br>1. Yellowish brown, may have a darker tip.<br>2. Distal 2/3 black, white band brown black band with white root, (51).<br>VENTRAL<br>1. Dark tip, general colour mid to light brown.<br>2. Completely black, may be lighter band near root, (53).        | DORSAL<br>1. Orange, uniform, may be darker at tip.<br>2. Shiny brown black, may have a slightly lighter band nearer the root, (50).<br>VENTRAL<br>1. Numerous orange yellow hairs.<br>2. Orange yellow, may have a light band 1/5 to 2/5 from base.       |

| Body Region         | <i>B.c. omnivora</i>  | <i>B.c. nigriscens</i><br>(Holotype)   | Remarks  |
|---------------------|---|--|--|
| Tail<br>Distal 1/3  | DORSAL<br>1. Usually banded, of various lengths.<br>2. Slightly curly, not straight reddish dk. brown, may have a light coloured base, (51).<br>VENTRAL<br>1. Light brown, may be slightly banded.<br>2. Slightly curly, black tips merging imperceptibly to a more reddish brown near base, white near roots, (52).          | DORSAL<br>1. Few curly hairs, mid brown.<br>2. Slightly curly to straight, virtually black, no light bands, (49).<br>VENTRAL<br>1. Mid brown, slightly banded with a darker brown.<br>2. Uniformly black.  | DORSAL<br>1. Fewer curly hairs, uniformly dirty orange.<br>2. Blackish to dark brown, (44).<br>VENTRAL<br>1. Dirty orange yellow colour.<br>2. Black with only a short region near base which is lighter, (50).                                      |
| Throat              | 1. Entirely golden yellow.<br>2. Golden yellow, no longer than curly hairs. (8).  | Mixture of curly and guard: Various colour types.<br>(a) Basal 2/3 light yellow, terminal 1/3 black.<br>(b) Entirely light yellow.<br>(c) Basal 1/3 dk. brown or black, mid 1/3 light yellow, terminal 1/3 black.<br>2. Guards hairs similar, (10)   | Only <i>nigriscens</i> has black tipped hairs. <i>omnivora</i> is very distinctly golden yellow.   |
| Ventral<br>Thorax   | 1. Thin curly type predominant, all yellow, some darker at tips.<br>2. Entirely dark brown, a few with yellow bases, (15).  | 1. Entirely brown.<br>2. Entirely dark brown.  | Underfur in <i>nigriscens</i> is darker than other species.  |
| Ventral<br>Abdomen  | 1. Predominantly light yellow.<br>2. Entirely dark brown, (15).   | 1. Curly hairs predominant, (a) yellow, (b) brown.<br>2. Black tip and yellow base. (25)   | <i>nigriscens</i> darker than others.  |
| Dorsal<br>Head      | 1. Light yellow throughout<br>2. Black tips $\frac{1}{2}$ , white bases $\frac{1}{2}$ , (8).  | 1. Yellow/brown, many with black tips.<br>2. Long than <i>omnivora</i> , black tips, middle white, black base, (10).   | Much darker in <i>nigriscens</i> than <i>omnivora</i> and <i>tenuis</i> .  |
| Back                | 1. Uniformly light yellow.<br>2. Two types: (a) black through out: (b) short black tip, light yellow middle, black band, white base. (30).  | 1. Some yellow but mostly brown<br>2. Dark brown to black, except root which is golden yellow, a few with yellow middle portion, (35).   | <i>nigriscens</i> is darkest of all, due to large number of long black guard hairs. More guard hairs than <i>crassicauda</i> . <i>puaia</i> is more obviously banded than <i>nigriscens</i> .  |
| Flank               | 1. Uniformly light yellow.<br>2. Short black tips, broad white band, black or white root, (25).   | 1. Uniformly dark brown.<br>2. Long black tips, white band, dk. band, light root, (30).  | Flank of <i>nigriscens</i> not so dark as back.  |
| Feet                | 1. Mid brown tip $\frac{1}{2}$ , light yellow base.<br>2. Dark brown except for light coloured roots, (5).  | 1. Mid brown.<br>2. Short guard hairs, dark brown throughout.  | All tend to dark brown feet.   |
| Tail:<br>Basal 1/3  | DORSAL<br>1. Black tips, long light yellow region, + dark base.<br>2. High proportion of long guard hairs, long black tips, some lighter at base, (40).<br>VENTRAL<br>1. Light yellow throughout.<br>2. Dark brown tip, wide yellow band, mid brown band, white root variable, (30).  | DORSAL<br>1. Black tipped, light yellow, dark brown base.<br>2. Very long guard hairs, dark brown to black: basal $\frac{1}{2}$ light and then with dark base, (65).<br>VENTRAL<br>1. Long black tip, light yellow band, dark roots.<br>2. Terminal $\frac{1}{2}$ or more, black, base light yellow, (65). | Tail of <i>nigriscens</i> black right to base dorsally; lighter ventrally at base. The <i>crassicauda</i> guard hairs have a purplish tinge which is not present in <i>nigriscens</i> . <i>nigriscens</i> has longer guard hairs than other species. |
| Tail:<br>Middle 1/3 | DORSAL<br>1. Long, predominantly light yellow, some slightly banded.<br>2. Mainly long. Uniformly dark brown/black, base light yellow or golden yellow/brown, (40).<br>VENTRAL<br>1. Tips mid brown, long light yellow region, long brown, light yellow base.<br>2. Shiny black for 4/5 length, basal 1/5 light yellow, (40). | DORSAL<br>1. Uniformly light yellow to mid brown.<br>2. Shiny black with or without light yellow bases, (60).<br>VENTRAL<br>1. Tip light brown, rest light yellow.<br>2. Entirely shiny black, some with mid brown bands. (60).  | All guard hairs dark brown or black ventrally except <i>tenuis</i> , which is not distinctly banded and has short guard hairs. <i>nigriscens</i> has longest guard hairs.  |
| Tail<br>Distal 1/3  | DORSAL<br>1. Very few: terminal 1/3 brown, basal 2/3 light yellow.<br>2. Black tips, may be black or yellow, (40).<br>VENTRAL<br>1. Very few, terminal third brown, basal 2/3 light yellow.<br>2. Black, some have white base, others are yellow except for black tip   | DORSAL<br>1. Yellow brown throughout.<br>2. Dark brown to black with paler root, (55).<br>VENTRAL<br>1. Few hairs, yellow brown with darker tip in some cases.<br>2. Shiny dark brown, brown yellow base, (55).  | All guard hairs dark brown or black at tip.<br><i>nigriscens</i> has longest guard hairs.  |

guard hairs are at least partially erected, their black tips tending to hide their lighter bases and the yellowish brown underfur. The flanks and belly are progressively less dark due to the relatively lower density of black guard hairs in these regions.

The tail of *B.c. nigrescens* is very distinctive, being broad compared with its length. It has a very dense covering of black hairs, particularly dorsally, which give it a "bottle-brush" appearance when the hairs are erected in the live animal.

## Biology

From trapping records and the fact that hardly anyone seems to have seen them in the wild, *B.c. nigrescens* would appear to be a nocturnal animal. In captivity it may become diurnal, though on the whole it remains nocturnal. It seems likely from the nature of the type locality, that it shelters in well-hidden holes in the rocks during daytime. Its narrow, only slightly curved claws do not suggest that the new sub-species is adapted for extensive digging, though it may well scrape up insect larvae from the surface layers of the soil. Moreover, its timid, docile nature indicates a shy animal that spends the daylight hours in strict seclusion.

All museum specimens obtained to date have been live-trapped and killed later, so that there is no information on diet from stomach content analyses. However, the animals kept in captivity did show certain food preferences. They would not eat bananas, mangoes or avocado pears and found difficulty in breaking open a chicken's egg. When the egg was previously broken, however, they lapped up the contents quickly. Their basic food was raw meat which was cut up into chunks and mixed with bone meal and multi-vitamins. One of the captive animals was also fed with wild young rats, live-trapped. It was very slow in catching them and did not appear to know how to kill them, seizing these rodents by the tail or back and then finally killing them by biting the back of the skull. One of the captive *nigrescens* was fed a 100 cm long stripe-bellied sand snake (*Psammophis subtaeniatus* Werner) which it soon killed and ate. This may indicate that the new sub-species feeds more on lizards and snakes than rodents, though its main food is probably insects.

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## REFERENCES

- COETZEE, C. G. 1967. Preliminary Identification Manual for African Mammals. 7. Carnivora. Ed. J. Meester. Smithsonian Institution, Washington.
- HELLER, E. 1913. New Antelopes and Carnivores. Smithsonian Misc. Coll. 61(13): 12, 13.
- PETERS, W. 1852. Monatsb. K. Preuss. Akad. Wiss. Berlin. p. 81.
- " 1852. Reise nach Mossambique, Saügeth. p. 119-125.
- PUCHERAN, 1855. Rev. et Mag. de Zool. (2):111.
- TAYLOR, M. E. 1969. The Distribution of the Genets in East Africa. *Jl E. Africa nat. Hist. Soc.* (In press).
- THOMAS, O. 1894. Ann. Mag. Nat. Hist. (6)13:522.
- THOMAS, O. and WROUGHTON, R. C. 1908. The Rudd Exploration of South Africa. IX. List of Mammals obtained by Mr. Grant on the Gorongoza Mountains, Portuguese S. E. Africa. *Proc. Zool. Soc. Lond.* (2):164-173.
- WALKER, E. P. 1964. Mammals of the World. II. Johns Hopkins Press. Baltimore.

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